

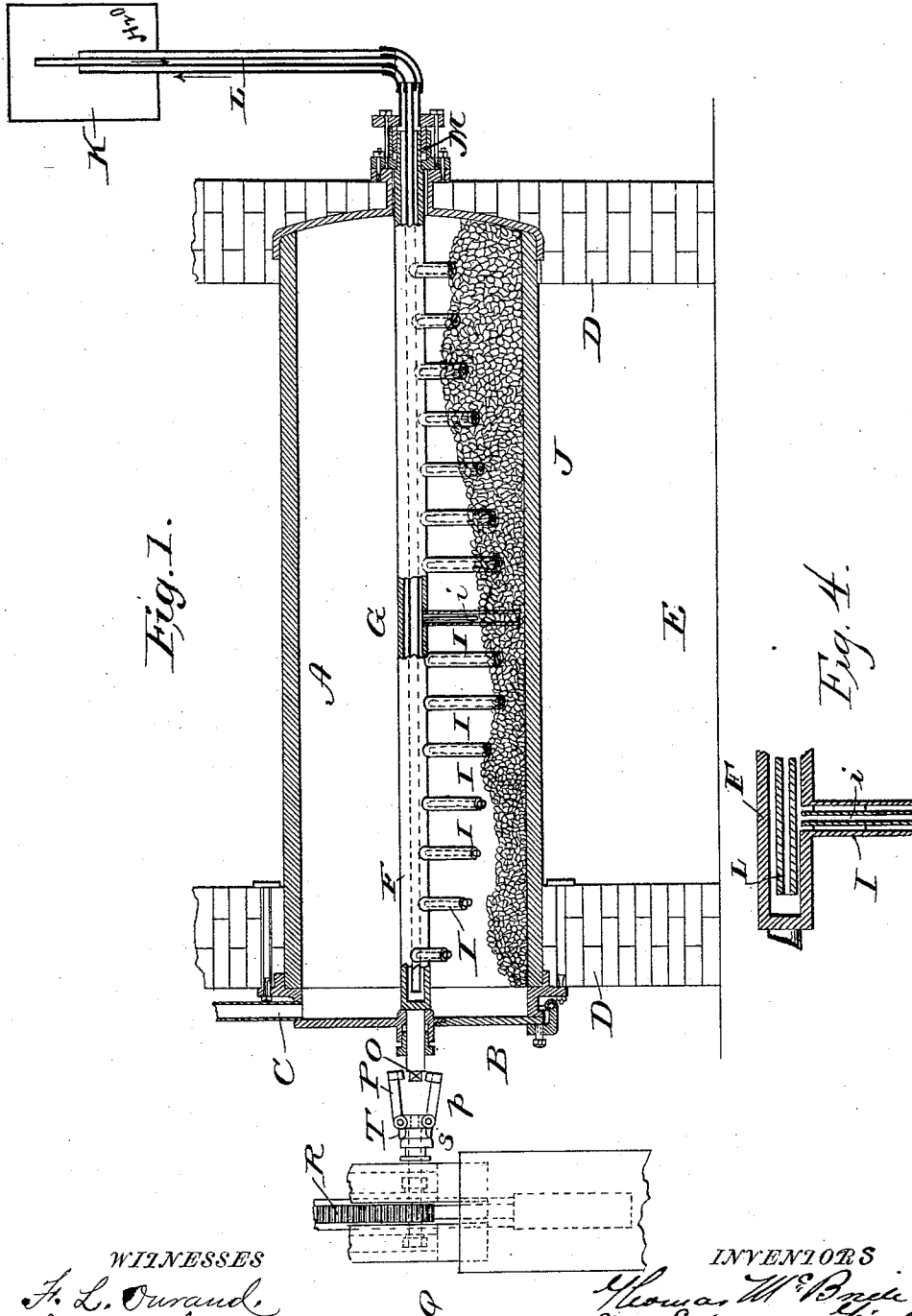
(No Model.)

3 Sheets—Sheet 1.

T. McBRIDE & E. FISHER.
APPARATUS FOR THE MANUFACTURE OF GAS.

No. 483,005.

Patented Sept. 20, 1892.



WITNESSES
A. L. Ouraud.
J. C. Hasbuck.

INVENTORS
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by N. W. Sterling Attorney

(No Model.)

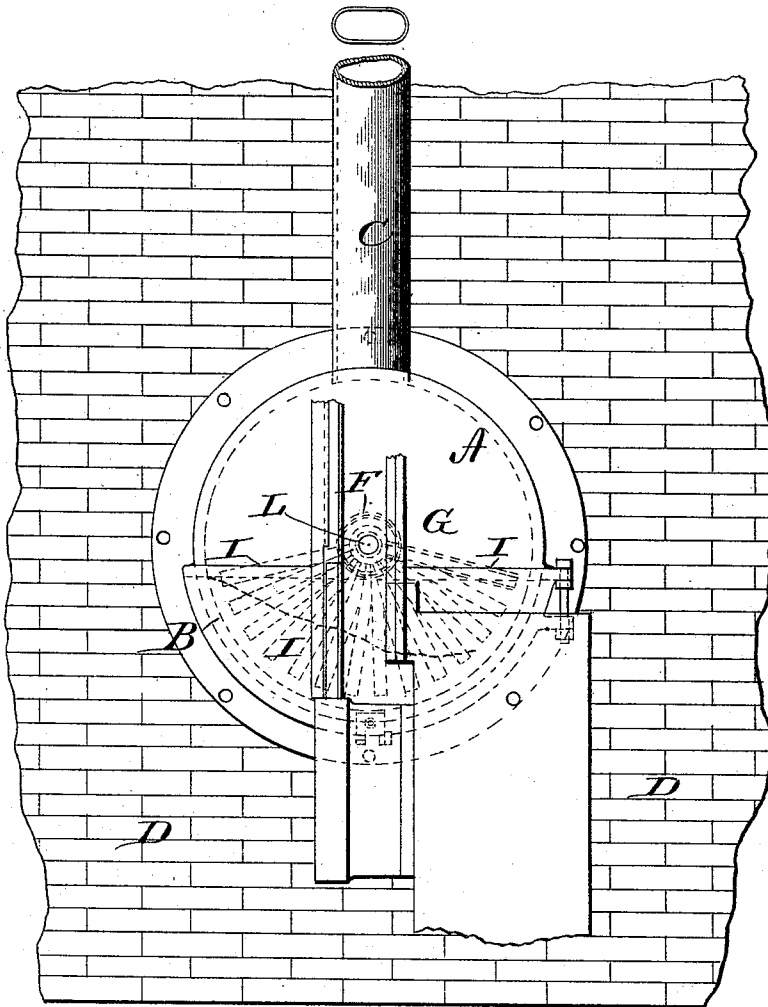
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Fig. 2.



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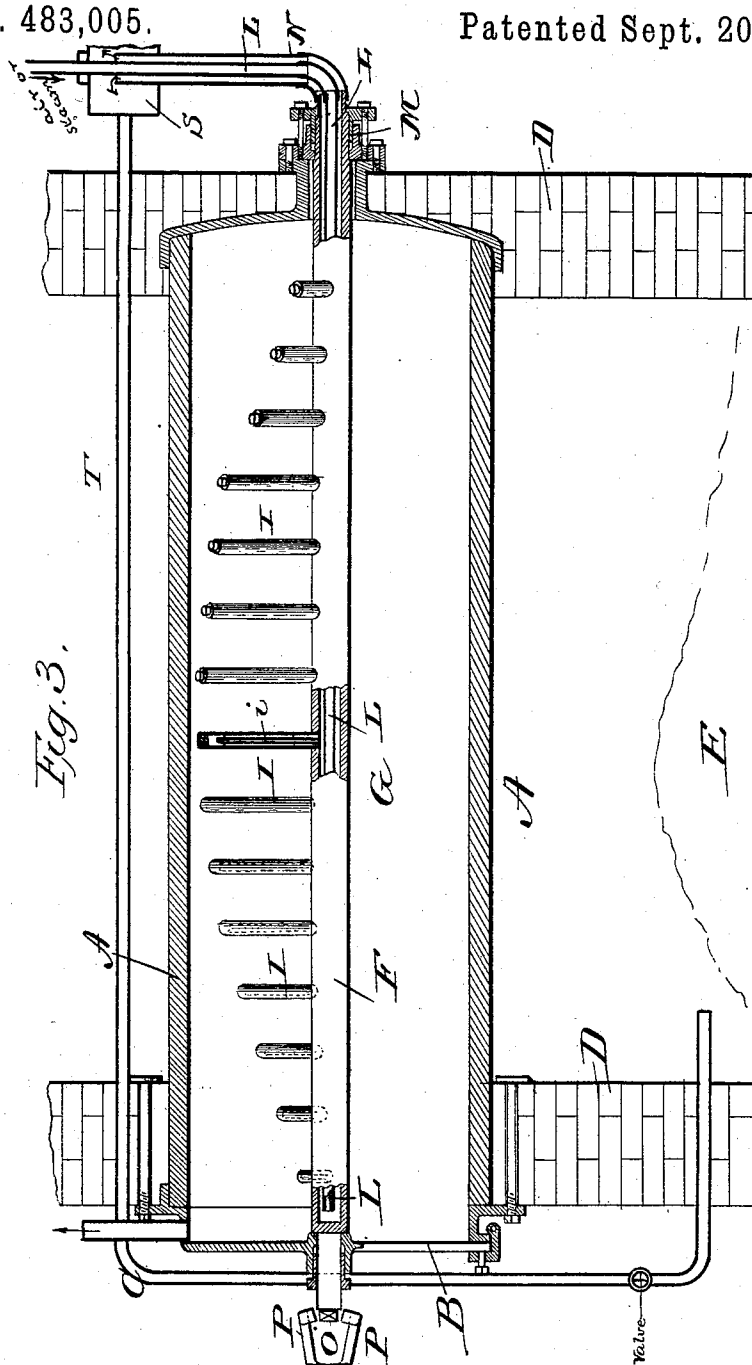
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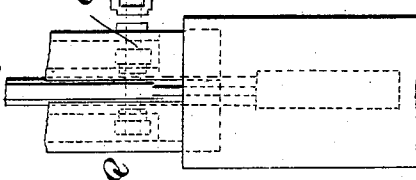
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UNITED STATES PATENT OFFICE.

THOMAS MCBRIDE, OF PHILADELPHIA, PENNSYLVANIA, AND EBENEZER FISHER, OF KINCARDINE, CANADA.

APPARATUS FOR THE MANUFACTURE OF GAS.

SPECIFICATION forming part of Letters Patent No. 483,005, dated September 20, 1892.

Application filed March 14, 1892. Serial No. 424,808. (No model.)

To all whom it may concern:

Be it known that we, THOMAS MCBRIDE, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, and EBENEZER FISHER, a subject of the Queen of Great Britain, and a resident of Kincardine, Province of Ontario, Canada, have invented certain new and useful Improvements in Apparatus for the Manufacture of Gas; and we do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in apparatus for the manufacture of coal-gas, the invention having particular reference to the manipulation of the charge of coal in the retort whereby to completely extract therefrom its gases and to obtain this result in the shortest possible time.

The present invention arises out of the fact that in the manufacture of gas from coal as ordinarily practiced no efficient means have been designed by which the charge of coal in the retort could be agitated without destruction to the raking or stirring device, owing to the intense heat of the retort. A raking device which will stand the heat becomes of great value from the fact that when the charge of coal is left undisturbed the mass is subjected to a very uniform heating and much of the gas remains locked up in the charge when withdrawn.

In order to overcome the loss consequent upon leaving the mass of coal undisturbed, it has been our object to construct a suitable raking device which will be made to revolve within the retort and keep the charge of fuel in a loose mass which will be uniformly exposed to the heat of the retort, and in so constructing the said rake that a cooling medium may be admitted thereto and be constantly circulating therein, whereby to prevent the destruction of the same from the intense heat of the retort.

Figure 1 is a longitudinal vertical sectional view of the retort, disclosing the charge of coal and the apparatus for stirring and breaking up the charge during the production of

the gas. Fig. 2 is a view in front elevation of the retort. Fig. 3 is a view of the retort similar to Fig. 1, a rake or interior device for breaking up the charge being shown in its raised position. Fig. 4 is a sectional view of one end of the rake, showing the interior of the circulating-pipes.

It will be readily seen that in the drawings three forms of devices are illustrated, by means of which the improved method is successfully carried into effect. The preferred form of apparatus is that shown in Figs. 1, 2, and 3, which consists, primarily, of a central revolving shaft extending through the retort and journaled in its ends and having projecting arms or teeth extending from the shaft for disturbing and breaking up the charge when the said shaft is revolved.

The retort A is of any well-known or usual form, being, preferably, in general shape that of a cylinder, having the door B for charging and withdrawing the charge after it has given off its gas and the pipe C for conducting off the gas as it is generated, the retort being suitably mounted in the brickwork D over the fire-chamber E. In the retort at its ends is formed a circular opening to provide bearings for the journals of the shaft F of the rotary rake G, through which openings the ends of the journals extend. A number of projections I are arranged on the shaft F at right angles to the length thereof and so located with respect to each other as to form a spiral arrangement thereof extending around one-half of the shaft. These projections I, which form the teeth of the rake, as the shaft F is rocked back and forth or rotated will pass through the mass of coal J, disturbing the same and exposing new surfaces to the action of the heat, thus obviating the objections incident to the manufacture of coal-gas as heretofore practiced. The retort being heated to a very high degree of temperature, the interior raking device might not withstand the heat to which it would be subjected, and hence it may be necessary to make some provision for protecting this part of the apparatus from destruction by the intense heat. The shaft F and projections I are made hollow for this purpose and filled with water, steam, or air, water, steam, or air being fur-

nished by the well-known methods. The water is supplied from the tank K by means of the pipe L, which enters the shaft F through the hollow journal at the rear of the retort.

5 The pipe L extends the entire length of the shaft F and is open at both ends, and the water from the tank K is discharged from this pipe within the hollow shaft at its front end to give circulation. The projections I, as
10 well as the shaft F, are filled with water thereby. The pipe L being surrounded by the pipe M, which is connected to the hollow journal N, allows the hot water in the hollow rake to be conducted by the said pipe N back
15 to the supply-tank. In order to form circulation in the tank I, an internal pipe *i* is provided in each.

In Fig. 3, instead of showing the apparatus adapted for the use of water as a cooling medium, we have shown it modified to be for the
20 use of either steam or air, which, from the utilization of the heat which would otherwise be wasted, we prefer to employ.

Air or steam is forced into the hollow rake
25 L from any suitable source, and, being heated in cooling the rake it, is discharged into the chamber S from pipe N, which communicates with the interior of said chamber. Connecting with the chamber S is a pipe T, which
30 traverses the length of the retort A and immediately above the same, and thence takes a downward direction and terminates in the fire-chamber E. By this pipe T the heated air or superheated steam is conducted under
35 the retort, and instead of taking cold air to produce the combustion of fuel this highly-heated air or steam is used and the heat instead of being lost is saved. The heated air or steam is further heated in passing over the
40 retort, and much of the heat which at this point is usually lost is by this arrangement utilized to aid combustion.

The journal of the shaft F at its front end is solid and projects through and beyond the
45 face of the retort and is provided with a square end O, whereby it may be clamped securely by the jaws P on the end of a shaft Q for imparting a rotary or rocking motion to the rake, the shaft Q being operated by the pinion-
50 wheel R, which is driven from any suitable source of power. The clamping-jaws P are held in their clamped position by the blocks

S, which slide back and forth on the shaft Q, and are placed between the short arms T of the jaws to cause the jaws P to come together, 55 the block S acting as a wedge.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus for the manufacture of 60 gas, a closed retort having mounted therein and journaled in the ends thereof a hollow shaft adapted to be revolved or rocked, hollow projections or teeth formed on said shaft and communicating with the interior thereof, 65 one end of said shaft having a hollow journal and connected by means of said hollow journal with a pipe communicating with the tank for supplying a cooling medium thereto, a pipe extending through the hollow shaft, 70 and the pipe connecting said shaft with the cooling-supply, and pipes open at both ends, extending into the hollow projections independent of the interior pipe of the hollow shaft, substantially as described, and for the 75 purpose set forth.

2. In an apparatus for the manufacture of gas, a closed retort having mounted therein and journaled in the ends thereof a hollow shaft adapted to be revolved or rocked, hollow projections or teeth formed on the said shaft and communicating with the interior thereof, one end of said shaft having a hollow journal and connected by means of said hollow journal with a pipe communicating with 85 a tank for supplying a cooling medium thereto, a pipe extending through the hollow shaft, and the pipe connecting said shaft with the cooling-supply, a fire-chamber, and an education-pipe connecting with the tank at one 90 end and passing over the retort and entering the fire-chamber, substantially as described, whereby a circulation of the cooling medium is provided within the raking device and the heat generated therein utilized to aid combustion. 95

In testimony whereof we affix our signatures in presence of two subscribing witnesses.

THOMAS McBRIDE.
EBENEZER FISHER.

Witnesses:

THOS. McBRIDE, Jr.,
JOHN McBRIDE.